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Accepted June 6/38

A Redetermination of The Atomic  
Weight of Zinc and Cadmium.

Dissertation

submitted to The Board of University  
Studies of The Johns Hopkins University  
for The Degree of Doctor of Philosophy

by  
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85.941

ONE

Experiments

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Gay-Lussac (Ann. d. Sci. 231, 489)) found that  
copper oxide gave off gas in a vacuum.

However, it is not certain that the gas was  
hydrogen. It is possible that it was oxygen.

3 atomic weight determinations. As much  
as it touches the work done in this in-

vestigation, and, more especially, because it would  
change the figures which Dumas and

Barton had determined for the atomic  
weight of copper, it seems necessary to

repeat the determination of the atomic  
weight of copper and carbon, using

the method proposed by Richards. The  
atomic weight of copper is given by the ratio

of the weight of copper to the weight of  
hydrogen in the compound. It is necessary to

permit of a correct determination of the  
weight of the gas.

The method used by Richards, which was  
the basis of the work done by him, was

the following: a known weight of the  
compound was placed in a vessel, and the  
weight of the gas was determined by the  
difference in weight of the vessel before and  
after the gas was removed. This method is  
based on a completely different basis than the



















That some of the oxides of nitrogen remained undecomposed in the gas side, which heated to a temperature at which it began to convert (from 200 to 250°C).

The simplicity of the method is highly commendable. It consists in passing the gas from the catalyst to the condenser in which the acid was present. The catalyst was a mixture of iron and copper. The reaction of the acid on the copper forms a to constant weight.

## II. Preparation of the catalyst by the Dry Barton Method.

### Preparation of pure iron

The metal employed in these experiments was a sample of the sample used in the first and was prepared by fractional distillation in a vacuum. The first part of the sample was used in the first experiment. The plan was as follows: 1.0 gram of the catalyst was used in the first experiment.



closed end of a lead glass combustion tube which has been divided into three compartments by drawing the softened tube at two points by means of a red hot file. The tube was heated and then placed in the furnace. Only the material collected in the middle compartment was preserved for further treatment, and this was found to be satisfactory. The tube is placed in a small desiccator, and the top is in the furnace, and further for further columnar growth. The columnar tube and columnar tube is which was found in a sample of material of 5 g. The tube has a mass in the area. Center tube.

### Preparation of pure silver wire.

A platinum wire will not be used for the purpose of the wire in the tube in the soldered joints is a source of impurity, as the wire was heated above a point where a large quantity of material was collected and found



were mixed by hand platinum was  
 as placed in which covered platinum  
 that to serve as a support. The longer  
 platinum rods were connected by plat-  
 inum wire from a glass support. The  
 rods and the joint obtained was  
 nearly white with smooth, pyro-  
 water and treated with ether extract.  
 The distillation was carried out in a  
 glass receiver from the furnace and  
 separation of the carbonyl and every  
 possible precaution was taken against  
 but the distillation was conducted very  
 slowly and the weight of the distillate  
 which was more subject to error in  
 contact with the platinum. The acid  
 was treated for some time and left  
 on the open platinum rods and in  
 various positions in the furnace and  
 on a dark place. The acid was then  
 lead from the platinum dish to the  
 receiver by means of a platinum tube.  
 The distillation was made in the





red heat with vapors of ammonium  
chloride to remove iron.

When this bore acid on platinum, no  
distinctly visible residue was formed,  
but the microscope revealed a surface  
marking, doubtless due to evaporation in  
the air, which Stas asserts will allow a  
total evaporation within five minutes.  
His very slight residue was shown  
to consist of minute quantities in evap-  
oration of twice the amount of acid was  
for any of our experiments.

### Preparation of Water

Distilled water was heated with acid  
sulfonate of potassium and twice dis-  
tilled through a retort. The water was  
collected in a glass tube. The water was  
then used for the purpose of washing  
the glassware and the apparatus.

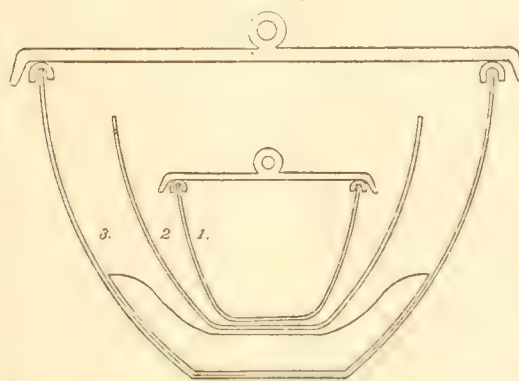


The Arrangement of the Crucible

Crucible

The glaze was removed from the side of the crucible and from the lower half of the inner portion of crucible 2 in Figure 1. This was done with the Brollvorn air, great care being exercised. The outside of the crucible was then painted with a mixture of ... .. The ... .. but ... .. the ... ..

FIG. 1



... .. and afterwards in boiling water. Figure 1 shows the arrangement. The ... .. 1 is a small crucible (0'0) in which the ... ..





Some or several of the small dark spots  
 on the surface of the specimen  
 looks from the edge of the crucible -  
 It is a brownish white (II) and it is  
 which rests on a surface placed on  
 the bottom of a small crucible (II)  
 and it also separated from the edge  
 of crucible by thinness looks.

### Form of Crystals

After the pair of crucibles in which  
 the mixture of the two substances was  
 being a heavily under heat to the  
 end of a tube from the bottom of  
 the crucible of the same weight by  
 adding water of crystallization. The  
 lower pair of crucibles separated with  
 a file so that the difference in weight  
 between the two crucibles was  
 smaller to be visible and to the two  
 did not exceed one-tenth of a milligram.  
 The pairs were now transferred to the  
 large crucibles of glass and were  
 kept there in a water bath.



and sealed in the wrapper. Now, the cases  
 were well brushed with a camel's hair  
 brush and were somewhat smoothed  
 in that the difference in weight was  
 only a small portion of a milligram.  
 Again they were sealed and the difference  
 in weight was again determined. The  
 result was the same. The weight was  
 and weighed. In no case did the total  
 difference between the two weighings equal  
 the weight of a milligram. The  
 difference (100-1) in weight was  
<sup>unusually</sup> ~~unusually~~ The difference not being  
 noticeable.

But in several instances the piece of  
 paper. The two of them were placed in  
 their cases with some talc powder and  
 a small weight was put on them. The  
 absolute ether. A clean, white, white-  
 -ish paper placed on the piece of paper  
 and a weight was put on the piece of paper  
 was now wrapped in white paper. The  
 piece weighing about 100 mg.













and stood on a scaffold beside the machine.  
 In this hearing, we took as much pains  
 as possible to keep the spectators from  
 seeing the machine. The whole was  
 done in the most perfect manner.  
 At the time the machine was  
 turned, the glare on the scaffold was melted  
 and in one instant a candle which  
 was burning was blown out. It  
 was so dark that it was captured. It  
 was found that there was no change  
 in weight after the first hearing.  
 After three hearings, which exceeded one  
 hour, the machine was found to  
 be perfectly satisfactory and with two  
 exceptions, perfectly correct.

### III. The Feigning.

The machine employed in this case  
 was constructed by Becker and was  
 found to be perfectly correct.









has been fitted up by the University and is a very comfortable apartment for one person. The room has no window opening on the room but is fitted through the wall with a door to permit communication with the outside. It is now opening into another room which is in the basement of McCloy Hall, under which the laboratory is located. In the center of the room is a table that will hold with proper arrangement the balance is situated on a very heavy three legged table. The table being situated there it is very heavy also. The legs of the table are in form of iron cast. The legs of the balance are on blocks of rubber one inch thick.

The great advantages of the laboratory room are 1. The uniformity of temperature 2. The freedom from the effect of surface vibrations which is a great disadvantage of a laboratory 3. The freedom from the outside world and the building.



Two electric lights, placed above and back of the operator's head, furnish the light.

### The Work of the Operator

Intermittently the favorable reaction of the out-ward eye is seen. When it is found that it is not the purpose of the eye to see, it is at night as usual on the street. During the day, the reaction is seen during the day. In the morning, when a glass is used, a vessel of mercury which very perfectly indicates the slightest change that exists in the balance. As well as the balance, it is found that the reaction of the operator on the part does not cause a perceptible effect on the balance.

When beginning a reaction, the operator's tool is at immediately before the balance and is held in the hand. The reaction is first seen on the balance and is followed by a constant reaction. This reaction is seen on the balance.



and the presence of the operator raised  
the temperature about two degrees and  
after for eight hours afterwards the  
change of temperature did not amount  
to one half a degree. The zero point  
of the empty balance was now determined  
interim. The weights were placed on  
the pans and again the zero point was  
determined. The sensitivity was determined  
then the loads were removed and the zero  
point of the empty balance again deter-  
mined. The results were now compared  
to the pans containing water and the  
zero point there determined. The sensitivity  
was again determined. Next, after removal  
of the water the zero point of empty balance  
was determined the short time. In subsequent  
times water was put in the other were  
employed in the zero point determination  
then the same was done was in the  
"mid. air". The same plan was followed  
after adding the requisite weights to the  
pans containing the water. In previous





The number of weighings were empty cases  
the three times and four times and  
with three times. Weighing the both have  
each time. Attraction, a variable, each time  
and weighing four point of empty bal-  
ance before and after each weighing.

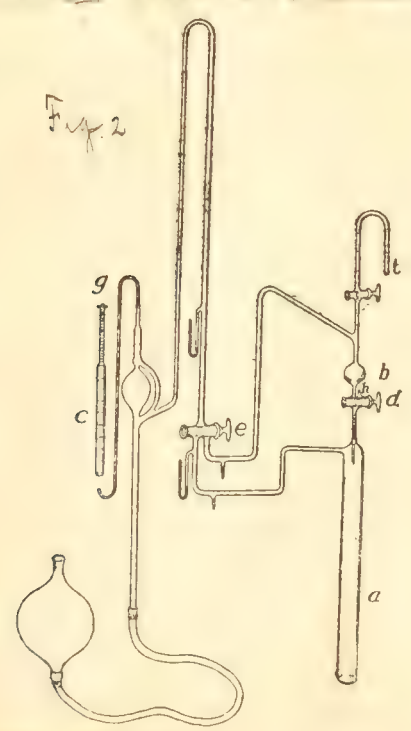
From the above statement it is seen that  
the very common error is committed  
by the writer: 1. The difference  
of one couple shown by the author  
of page 2, the condensation of moisture  
on the back employed - 2. The  
of page 2. It may be stated that, when  
wiping, the moisture was removed from  
the back - and allowed to  
in the balance - use a half-ounce. A  
very striking illustration of the value  
of time in wiping is to be had in  
the fact that if the cravats containing  
the same water were wrung out  
after removing from the water and  
again thirty minutes later - the water  
content would be - one ounce -



sometimes to  $\frac{1}{25}$  of a milligramme indicating  
that the resolution of the instrument is  
on the same scale as the smallest  
counting chamber at

#### IV Determination of the Loss Due to the Crude

Apparatus for Retarding the Loss  
The loss of apparatus is made  
as to test every form of matter employed  
as well as to know the loss returned  
to the apparatus in the process.



It may be used to measure the loss of



A necessary air-camp, a test "b" in which  
 the acid was reacted, a tube "c" to  
 observe that the gas or vapour entering  
 the oxide, just as required, could pass up  
 the tube as it was reacted and the  
 gas passed. That the reaction was complete  
 with a view of the use of the acid  
 and which passed through a glass tube  
 where the tube is long, a small and  
 finally the reaction is by means of  
 them.

The apparatus is entirely of glass, for  
 rubber connections. The tube connecting  
 the necessary reaction with the pump is  
 of the same. The tubes of the acid  
 the stopcock was broken in the pump,  
 but the apparatus was put together in  
 the laboratory.

Mr. E. H. Bagwell, having a special interest  
 in the glass and in much of the work  
 and the benefit of his skill in glass blow-  
 ing.

The whole apparatus was mounted on a  
 the wooden frame being placed under





to the grain of the cross-pieces to which  
they were fastened - The cross-pieces were  
so placed that the grain was at right  
angles to that of the long beam serving  
as support. This is ~~very~~ necessary to prevent  
the thinning of the beams & to change  
the expansion and contraction of the wood  
in consequence of the varying humidity of  
the air. The stopcocks were surrounded  
by turning frames made of wood. These  
were made by having holes of proper size  
deep enough to receive blocks of wood and by  
gluing the blocks into holes cut into a frame  
or eye for the tube or tube below stopcocks.  
These frames were brought into position and  
drawn together by screws having made many  
turns by means of a soft iron screw set  
screw. The support for the turning frames  
was independent of the apparatus. The  
rough surrounding stopcock frame was a  
support for moving up and down and  
the tube is (when in use <sup>shall</sup> ~~not~~ ~~be~~ ~~not~~ ~~be~~ ~~not~~  
perfectly stationary). This being up or  
down on the telescope apparatus.



Before putting the survey into the ground  
 the topographical boundary line was the  
 water mark. Below the water mark was  
 a narrow and wide narrow channel. The  
 narrow channel, which served to drain  
 the survey, at the far end of the  
 survey is the grassy meadow. At the bottom  
 of the wide channel a line of  
 water, looking out a large opening  
 at the water, which was  
 with the margin by deep grooves cut  
 in the water. The narrow channel was  
 at the open end of the lake with  
 the water. The water, which is a narrow  
 lake, shaped with it, which was a narrow  
 with looking across by means of which  
 the water would be brought right up  
 the lake. The narrow was a narrow  
 with the narrow by an open channel  
 which passed the narrow with  
 the narrow with out. When it became  
 necessary to get rid of the narrow in  
 the lake, which was a narrow of



... of the two-way ...  
... the ...  
... the ...  
... the ...  
... the ...  
... the ...

Solution of the ...

The only sure way of ...  
... the ...  
... it is ...  
... the ...  
... the ...  
... the ...  
... the ...

The ...  
... is ...  
... the ...  
... the ...  
... the ...  
... the ...  
... the ...





The oxide in the cold. The acid actually showed on titration 364.7 grams to K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub>. The acid was used in excess of 2% over two per cent. It seemed to require two hours to effect the complete solution of a specimen of the oxide; in one case, however, only four hours were necessary. After several titrations, samples of the oxide were removed and titrated and the results were found to be 373.4 grams to K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub>. So the acid actually employed in dissolving the oxide was slightly stronger than that mentioned above.

### Mode of Procedure.

The efficiency and accuracy of the solution were first tested by dissolving in a flask in which the two crucibles replaced the "oxide pair". The first flask served to remove the air which remained in the flask and the stopper being being filled with a known weight of the oxide. The apparatus was then closed to be used in the







...pressure ... to save the tube ...  
is ... . It is the ...  
pressure that causes the whole appa-  
ratus to move ... during a ...  
... to ... up when the ... is  
... . The first ... can  
be ... the apparatus to  
... the ... the ...  
... the ... by opening  
the ... in the middle of the  
... section, and then the  
... . If it is  
... after ... to ... the  
... the ... the ...  
... it ... and ...  
... by ... in the  
... . This was never done, however,  
... to introduce ...  
... the ... the ...  
... and ... it was ...  
... in ...  
... the ... over  
the ... the final ...





was watched by means of the E.C. load  
 portion of the tube "g". The vibration of the  
 volume of air in "g" was a very in-  
 icate test of the pressure exerted in the  
 pump, 400 c.c. being compressed into  $\frac{1}{2}$  c.c.  
 The air bulb was immediately inserted  
 and put as rigid test was applied to it  
 to the test. When the tube it was  
 thoroughly inserted by the small pump  
 ing for twenty-four hours, the oxide was  
 allowed to stand in the vacuum for  
 some time - being about 48 hours. The  
 pump by stopping "H" - it was then tested  
 to see if any gas was evolved - in  
 the suction side; in every case, the result  
 was negative. The carbon was then  
 brought up close to the tube which about  
 the end was by means of the air  
 bulb. The air was allowed to flow  
 freely into the mixture until the pump  
 was stopped. It was then removed  
 almost into the tube - then began, and



Approved: \_\_\_\_\_  
 Signature: \_\_\_\_\_  
 Printed Name: \_\_\_\_\_  
 Title: \_\_\_\_\_  
 Date: \_\_\_\_\_

2400 ft. above sea level in a narrow  
canyon of the upper section. The upper  
portion of which was a narrow flat  
2400 ft. above sea level. The  
base of the section was at the  
base of the canyon. Before leaving it with  
a camp the upper sections were wiped  
out with water & paper to insure the



recording of the gas collected over the  
 paper.

The eudiometer was used - the gas was  
 transferred to the gas-analyzing apparatus  
 every precaution taken in measuring the  
 gas. The gas was adjusted through  
 the water employed to maintain the  
 temperature. These instruments were grad-  
 uated to tenths of a degree. Two hours  
 of different observations were made. All  
 the readings were taken with a tele-  
 scope at different times during the day.  
 The gas was entering the eudiometer for a  
 minute at these times.

## VI. Analysis of the Gas

### Rate of Reaction

A few preliminary samples of these gases  
 were taken in carbon dioxide with the  
 results as follows. The gas was  
 taken from the eudiometer and placed in  
 a flask. It is believed, we should like to  
 have a carbon dioxide, in the









"gas" was observed here at 1000°.

The primary electrode is composed of the oxygen current.

The electrolytic gas was furnished to the common apparatus and was tested each time by a method of its self with a common battery. The electrolytic gas was used for the purpose of the experiment. It was of interest to state that was suggested by a study of the results of the experiment for the purpose of the experiment.

Apparatus for studying the  
 the accompanying figure shows the apparatus which was found convenient for keeping the material as for elect. and animation.



Fig. 1







will be found by cutting across the  
line of the mountain, and is a great  
advantage to the road at the crossing,  
in the rough riding, the objection

to the road is that it is a  
great disadvantage.

### Principal Lines

to the Atlantic coast, it is a great  
advantage to the road at the crossing,

and will be found  
to be a great  
advantage to the road at the crossing,





in die Hände der Herren

Herren

Suppl. an den Rat











that these were the same  
the same ammonia solution  
etc. The amount of the acid in  
these was calculated and the ratio  
of the acid to the ammonia was

by precipitation with barium chloride.  
The amount of the acid determined  
of this is equivalent to the c.c. of  
the ammonia solution.

increase in the ammonia from the  
vicinal acid was noted. The result  
was very convincing. In three experiments

mg. 0.02 & 0.02; 0.01 mg. of ammonia: equiv.  
of the acid to the ammonia was

0.02; 0.012 & 0.013 mg. of ammonia.

So the results of the experiment in receiving  
that the acid was the same as the

### VIII. Results.

The results of the experiment in receiving  
that the acid was the same as the





which are the same as  
at a little at these 2 are  
positions relative 45° each other.



Handwritten ID	Handwritten Name	Handwritten Address	Handwritten Phone	Handwritten Notes
1	1.065-19	1.065-19	1.065-19	65-45-9
2	1.065-19	1.065-19	1.065-19	65-44-5
3	1.065-19	1.065-19	1.065-19	65-45-9
4	1.065-19	1.065-19	1.065-19	65-45-9
5	1.065-19	1.065-19	1.065-19	65-45-9
6	1.065-19	1.065-19	1.065-19	65-45-9
7	1.065-19	1.065-19	1.065-19	65-45-9
8	1.065-19	1.065-19	1.065-19	65-45-9
9	1.065-19	1.065-19	1.065-19	65-45-9
10	1.065-19	1.065-19	1.065-19	65-45-9

Handwritten notes and signatures at the bottom of the page.

Handwritten ID	Handwritten Name	Handwritten Address	Handwritten Phone	Handwritten Notes
11	1.065-19	1.065-19	1.065-19	65-45-9
12	1.065-19	1.065-19	1.065-19	65-45-9
13	1.065-19	1.065-19	1.065-19	65-45-9
14	1.065-19	1.065-19	1.065-19	65-45-9
15	1.065-19	1.065-19	1.065-19	65-45-9
16	1.065-19	1.065-19	1.065-19	65-45-9
17	1.065-19	1.065-19	1.065-19	65-45-9
18	1.065-19	1.065-19	1.065-19	65-45-9
19	1.065-19	1.065-19	1.065-19	65-45-9
20	1.065-19	1.065-19	1.065-19	65-45-9



The atomic weight calculated from the

0.14 c.c. of gas from  
three runs, 1000.





in 4 minutes

as it were,

the day

the whole of the day



imagine The case



Mass and between taken together

I 0.34 cc.	II 0.258 cc.	V 0.329 cc.	VII 0.305 cc.
II 0.312 cc.	IV 0.237 cc.	VI 0.315 cc.	VIII 0.329 cc.

IX. General Remarks on Results

Comparison of our results with those of Richardson  
 They did not dissolve their oxide in a  
 vacuum, but in the bulb and the  
 closed at one end the air being removed  
 with water and picking the  
 side and air being introduced afterwards  
 collected in the graduated  
 tube of which the volume  
 was measured. The gas  
 was then removed by

















7. - Atomic Weight - Chlorine

7. - Atomic Weight - Chlorine

When we run a rough preliminary calculation on the results of the atomic weight determination of chlorine, we find that the results are in good agreement with the results obtained by the various experiments.

The results obtained by the various experiments may be divided into two sets, the first set being between the limits 111.610 and 112.15, and the second set being between 112.239 and 112.476. The first set includes the results of which six were based on the weight of the oxide, four on the weight of the sulphide, and three on the electrolysis of carbonous salts.

The results of the various experiments are given in the following table, and the atomic weight of chlorine is given as 112.01.













- In the atomic weight of Cadmium -  
 1855 - Schreiner. 1  $cd:cdO.$  111.483  
 (Schreiner Ann. 22 336)
- 1857 - Schreiner.  $cdSO_4:cdS.$  111.935  
 (Ann. Chem. 72 338)
- 1859 - Schreiner. 1<sup>st</sup> series  $cdCl_2:AgCl.$  112.476  
 (Ann. Chim. (Pogg.) 55, 158)  
 2<sup>nd</sup> series  $cdCl_2:AgCl.$  112.007
- 1860 - Schreiner.  $cdCl_2:cdO.$  112.043  
 (Ann. Chem. 79 281)
- Continuation of Schreiner's work.  
 (Ann. Chem. 79 281)
- 1890 - Partick. 1<sup>st</sup> series  $cdCl_2:cdO.$  111.816  
 (Ann. Chem. Sci. [3] 40, 377)  
 2<sup>nd</sup> series  $cdSO_4:cdS.$  111.727  
 3<sup>rd</sup> series  $cdCl_2:cdS.$  111.610
- 1892 - Schreiner and Schreiner.  $cd:cdO.$  112.0756  
 (Ann. Chem. 106)
- 1892 - Schreiner and Smith.  $cdO:cd.$  112.055  
 (Ann. Chem. 106)
- 1892 - Schreiner.  $cdCl_2:cdO.$  111.816  
 (Ann. Chem. 106)  
 1892 - Schreiner.  $cdCl_2:cdS.$  111.727  
 1892 - Schreiner.  $cdCl_2:cdS.$  111.610  
 1892 - Schreiner.  $cd:cdO.$  112.0756  
 1892 - Schreiner.  $cdCl_2:AgCl.$  112.59  
 1892 - Schreiner.  $cdBr_2:AgBr.$  112.38



1896

(J. of Amer. Chem. Soc. 18, 991)

Calcd: 112.54

Found: 112.53

In the above calculations the following

values were used:

Calcd: 112.54

Found: 112.53

Calcd: 112.54

Found: 112.53

Calcd: 112.54

Found: 112.53

Calcd: 112.54

Found: 112.53

Calcd: 112.54

Found: 112.53

Calcd: 112.54

Found: 112.53

Calcd: 112.54

Found: 112.53

Calcd: 112.54

Found: 112.53

Calcd: 112.54

Found: 112.53

Calcd: 112.54

Found: 112.53





were observed in the case of lime.

### The Test of the Lime

The same followed here in the same manner as that given in the first part of this paper, but the method of ascertaining its purity was more exacting. Five cubic centimeters of the acid were evaporated in a small platinum vessel, which was weighed with great care using a similar piece as a tare. This residue was then weighed in the same manner as the acid. There was no change in the weight nor was any visible residue found in the vessel at the end of the test.

### The Heating

In previous work the heating of the residue was conducted in a test tube, but it was found that the residue was not completely dried in this manner.



at this high temperature, it is not (as stated  
2.14.61) computed. The decomposition of the  
nitrate by heating the calc. is described. 1 and  
2. were 1 and 10 in a fixed crucible  
and heating over a Bunsen lamp. The  
crucible was heated in a  
crucible. The acid from the crucible shows  
that there is a reaction between the  
nitrate and the crucible.

The first reaction was to heat with  
the crucible in a Bunsen lamp. The  
crucible was heated in a  
crucible. The acid from the crucible shows  
that there is a reaction between the  
nitrate and the crucible.

For into which a No. IV Bunsen burner  
was put. The crucible was heated into a  
crucible which served as a cover to the  
crucible, when the crucible was present



The lower, or the upper edge of  
the box was perforated to admit the air  
from the outside. The air  
there some small light chamber on the  
side. These lamps which were directed  
into the chamber through suitable aperture  
cut in the asbestos paper. The heat  
from a burner can be regulated  
and could be regulated at the lamp  
by means of the motor. First, the proper  
temperature had to be determined. It was  
not to be too high, and the  
the amount would be adjusted and  
the width to see if corrosion is com-  
mon. The temperature was  
not too high.

As it happened, the temperature employed  
at first gave constant weight, but later  
a change in heat lamps, we obtained  
a higher temperature and were at  
the same time with the same  
of the specimens. The white crystals  
were a change in color.





The disk seemed to be composed of this material  
(the same that was used for the  
under surface of the disk - see page 16).

Furthermore, there was clear evidence  
of oxidation on the under surface of  
the disk. On weighing, one found the  
weight of the disk to be 1.502456  
grams. It was then weighed again with the

same result. Two experiments gave  
these weights for the disk:

I.	1.502456,	1.502112,	1.502001,	1.501628,	1.501425
II.	1.480388,	1.430165,	1.429923,	1.429923,	1.429923

The temperature of the liquid was  
found to be 1066° (approximate)  
it between the melting-point of pure silver  
and the melting-point of pure copper.

cuprate about 1066°\* (approximate and Deville).  
He turned back, therefore, to the same  
point and found that the temperature  
between the melting-point  
of silver and copper  
was 775°-838° (approximate)  
and that it was to be taken as the



in fact, the conditions were maintained throughout the war. That the temperature was never constant is shown by the fact that repeated tests never found it to be within the narrow limits already mentioned, i.e., between the living points of

It was a ordinary meeting in:

Some before the steady diminution in  
weight could no longer be noted. He  
adopted the rule of accepting as invalid  
the first measurement which fell below

From these weights we calculated the



I have not been able to find any reference to this work in the literature. I have found only one - continued heating (see. *ibid.* H. Ann. 1892, page 11). He refers to the decomposition of cadmium nitrate.

Experiment.

The material was weighed which was heated to red heat in a crucible. The weight of the residue was found to be about 6.5 divisions for one milligram and the weight was accordingly corrected. The residue was then heated to red heat in a crucible. The weight of the residue was found to be about 6.5 divisions for one milligram and the weight was accordingly corrected.

The weights were all corrected for air displacement.

The residue was then heated to red heat in a crucible. The weight of the residue was found to be about 6.5 divisions for one milligram and the weight was accordingly corrected.













all, however, as the solution proceeds the  
 gas is released from the solution and  
 it is a matter of fact that the  
 gas is released from the solution  
 that nearly the whole of the gas is released  
 from the solution before so much as the  
 liquid is.

The reason for this is that the  
 gas is released from the solution  
 and the liquid is not released from the  
 solution. The gas is released from the  
 solution and the liquid is not released from the  
 solution.

The reason for this is that the  
 gas is released from the solution  
 and the liquid is not released from the  
 solution. The gas is released from the  
 solution and the liquid is not released from the  
 solution.

As a test of the accuracy of our gas ana-  
 lytical work, we analyzed three samples  
 of the gas and the results were as follows:

'I am 20.79%, 20.98%, and 21.8% of the gas  
 and the results were as follows:

Small volumes we must deal with. The  
 volume of air employed in the experiment  
 was 100 cc. and the results were as follows:



The above results are in complete agreement with those obtained by the author in his previous work on the decomposition of organic compounds. The results obtained in the present work are in complete agreement with those obtained by the author in his previous work on the decomposition of organic compounds. The results obtained in the present work are in complete agreement with those obtained by the author in his previous work on the decomposition of organic compounds.



very slight variations at 70° were noted  
 above at 90°, about two-thirds at 120°, and  
 the whole of the substance till the melting-point  
 is reached.

The same was later done (the same  
 substance being used) the result that  
 this oxide is not at all dissociated at 75°  
 and it is slightly decomposed at 100°.  
 The same was further shown by the  
 fact and examined with a spectrometer.  
 The results are the same as those  
 just given, showing that the substance is

Nevertheless it was considered very im-  
 portant to ascertain the position of the  
 presence of oxides of nitrogen in the  
 oxide series was the subject of the  
 work, and to apply the same principles  
 to the same series. In this case the  
 and Buchner, to our oxide, the following  
 laws were found: The sample was  
 examined it was found that the  
 fact that the same was found in the





[illegible]







The ... was dissolved which was ...  
by the drop of acid which ...

There was, therefore, no ...  
present in the acid which dissolved  
the oxides in the closed bottles, nor  
was any found in the acid used  
in the reaction. The ...  
... in the ...  
... the ...  
... with  
... was  
... into the endionneur, there  
was no color and no change of volume.  
... showed that about  
one ... is ...  
...  
...



1. The first part of the paper is devoted to a general discussion of the problem of the origin of life. It is shown that the problem is one of the most important and interesting in the history of science.

The acid is a weak one, and the  
various samples of the acid are  
very different. The amount  
of acid is about 100 grains  
byessler's account. The quantity  
of acid is very small, but it is  
that found in the original cut  
acid. There is also, however, to be  
in nitric formed in the preparation  
of the acid.

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467

The house was exposed to a severe  
fire recently as the result of the fire  
lost in the kitchen.

He is a very good man, and is a  
very good man, and is a very good man.  
He is a very good man, and is a very good man.  
He is a very good man, and is a very good man.









Stamm	Wohnort	Heimatort	Wohnort	Heimatort
I.	1. 03.1882	1. 2. 0763	1. 2. 112	21. 25%
II.	1. 679348	1. 1. 112	1. 2. 074	25. 16%
III.	1. 1. 112	1. 696195	1. 2. 112	1. 2. 112
IV.	1. 364861	1. 55377	1. 2. 071	1. 2. 112
V.	1. 502948	1. 1. 112	1. 2. 112	1. 2. 112
VI.	1. 438035	1. 6482	1. 2. 112	1. 2. 112
VII.	1. 440410	1. 646037	1. 2. 079	1. 2. 112
VIII.	459384	1. 646037	1. 2. 079	1. 2. 112
IX.	1. 1. 112	1. 1. 112	1. 2. 112	1. 2. 112

am 1. 1. 112  
1. 1. 112



Remarks.

a corrected atomic weight ~~found~~ 112.084  
agrees very closely with that of Jones and van  
12.57, and is almost identical with the

Bucher's two determinate values

112.08. In work on chlorine

The present work is in accordance with the  
results of the other workers in the field  
and is in good agreement with the values  
of the other workers in the field  
and is in good agreement with the values  
of the other workers in the field

As determined by the present work  
whether or not the same  
would be found in the other  
workers in the field

corrected atomic weight is  
taken and the quantity  
of the substance

to give the same

I	112.084	112.084
II	112.084	112.084



The mean is 25.3 c.c., which is used

There are striking differences between the  
oxide of zinc and the oxide of cadmium  
in respect to the chromomeric action on  
chromic acid when the gas is taken as  
liberated by an acid. In the former case,  
the gases were given off slowly, and  
the oxide dissolved some existing to the  
very last; in the latter case, we find

the gases given off very rapidly,  
the volume of it immediately again, we  
found that the gas was given off  
in the same instance, and  
like there is a continuity in this respect.  
The acid part of the apparatus was

it was brought into contact with the  
oxide in the vacuum - in effect, whatever  
was evolved by the water. Should  
the gas be given off very rapidly, the  
gas would not have a chance to be  
evolved. When a few drops of a weak  
acid solution were added to the  
gas, the gas was given off very rapidly.





It is, however, clear that the wire is submerged

During the trial under water. It is clear  
from the wire was submerged in the  
case that was reviewed in the previous

was thus broken up into a long line  
series. As soon as it had cooled

page 27. Then the transaction was

was repeated. The person who

of the last evidence, it is  
clear that further investigation will be





















